

## The Dawn of the Next OS/2 Warp Server: Depend on it for e-business transformation

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Business today is probably more complex and more risky than ever before. Fortunately this complexity and risk bring excitement and opportunity. From IBM's perspective, the driver of today's greatest opportunities is computer technology.

- It's creating consumer demand for fast, easy access to information.
- It's applying the pressure of global competition, further intensified by deregulation, megamergers, and nontraditional competitors cropping up.
- It's adding pressure to lower operating costs, increase revenues, reduce inventories, and speed the pace of new offerings.
- It's enabling businesses to become more responsive to the market.

Ironically, previous technologies, are now creating pressure for change. It's not just the promise of the future motivating transformation, but also the issues of the past. Current computing environments are filled with a wide array of system types. The average large enterprise currently supports nine to ten different operating systems. The heterogeneous mazes that support the computing needs of today's corporations are exceedingly complex. Not surprisingly, Information Technology (I/T) costs are skyrocketing.

While the Internet, Java and other new technologies are key to responding to these opportunities and challenges, they are only the top layer. Supporting these new technologies requires a robust and flexible infrastructure that can weld the dependability of the existing systems, which have reliably performed billions of transactions, to the power of the web. This, of course, is the essence of e-business.

When a business successfully transforms into an e-business, it begins to benefit from three characteristics -- aptly referred to as e-business values:

- Enables secure, universal access to anyone, anywhere
- Adopts a portable application model enabling them to write applications once, and run them anywhere
- Leverages their existing infrastructure to ensure enterprise class dependability

The measure of success in any of these three areas directly depends on the elements comprising the underlying e-business infrastructure. IBM has enhanced the already dependable and flexible OS/2 Warp Server to support a successful and cost effective e-business transformation. The next generation OS/2 Warp Server, code-named Aurora, will be ready for e-business with planned availability in the first quarter of 1999.

### Building a Base for Secure Universal Access

The information systems of an enterprise that provide universal access to employees, customers and business partners have broad visibility and exposure. When systems supporting widely accessed applications fail, they can cause more than just a costly disruption of operations. The failure can affect the company's image, potentially impacting sales and revenue. For some businesses now -- and for many in the near future the negative impact of computers going down can be much greater than in the past.

resources that a Tivoli Management Environment can deal with at the same time, and increases efficiency. Tivoli Framework LCF supports OS/2 as an endpoint for TCP/IP. The LCF endpoint agent for OS/2 makes Aurora "Tivoli Ready".

While server availability is critical to universal access, the other half of the equation, namely the clients, is also important. When enterprises offer universal access to applications and data, end users become extremely dependent on their computers. The latest level of **Netfinity Manager and Client Services, Netfinity 5.2**, included in Aurora, gives network administrators the visibility and capabilities they need to initiate and manage services for LAN-connected clients and servers. Netfinity for OS/2 is the ideal solution for departmental server/client management.

Another important aspect of universal access is making all things accessible. In an age of total accessibility, it becomes unacceptable for one system not to be able to get to a file located on another. Enabling business data to be shared horizontally across the enterprise helps increase its value. Aurora delivers cost-effective ways to manage information and share intellectual property interdepartmentally, company-wide or using the Web. With **Network File System (NFS)**, a feature included with Aurora, a RISC (AIX/UNIX) drive can be mounted and made a sharable resource to OS/2 Warp Server's clients.

In addition, Aurora's remote connection services give users full, secure access to the LAN from home or on the road, using the integrated **Virtual Private Network** function of the TCP/IP stack and its **point-to-point protocol (PPP) server** function. The IBM Enhanced Remote Access Connection Server for OS/2 Warp Server allows point-to-point protocol (PPP) clients, including Microsoft Windows NT, Windows 95, IBM OS/2 Internet Dialer, and IBM 8235 users, to remotely access the LAN. This Aurora feature offers OS/2 Warp Server users a wide variety of remote client access support and offers new levels of performance and security plus low cost of ownership, adding further value to the OS/2 Warp Server network operating system.

### **Preserving Past Investments while Preparing for the Future**

Many large enterprises rely on mission-critical applications that run on OS/2 and would be fine left alone in a world that stands still; but implementation of a common currency across Europe and the year 2000 are looming on the horizon. Business requirements change as we approach the 21st century. Businesses need to move forward, but equally important is there need to preserve investments they've made in applications, systems and hardware.

Trade press and business publications continue to report extensively on the Year 2000 problem, frequently focusing on extreme examples. While predictions range from the most dire to a bothersome blip, time is running short for corporations to stabilize mission-critical applications so that they function correctly in the 21st century. And with the euro currency going into effect in 1999, applications need the ability to work with the new code pages. Aurora includes Year 2000 and euro currency readiness to help safeguard companies from the obvious, and not so obvious, ramifications of these changes.

The **Logical Volume Manager (LVM)** in Aurora will make it easier to manage dynamic DASD requirements. Many terabytes of data are added to the Internet every month. This growing volume of files and databases requires expandable system DASD. Logical drives can now span multiple physical hard drives. With permanent or sticky drive letter assignments, hard drives can be moved or added without changing their drive letter designation. Partitions can grow without reformatting.

One of the ways in which technology causes change is by constantly providing the means for engineers to create new devices. These devices are good for business -- they make things run faster, better, and easier.



With this in mind, IBM designed Aurora to make OS/2 Warp Server even more robust. To eliminate lengthy file system recovery times after a system crash with a current file systems, Aurora includes a **Journalled File System (JFS)**. Using database journaling techniques, JFS can restore a file system to a functional state in a matter of seconds or minutes. In contrast to a non-journaling file systems, Aurora's JFS provides a quickly-restartable, transaction-oriented, log-based, scaleable file system. JFS is key to improving server availability.

The performance and reliability that JFS provides makes Aurora ideal for Web serving. Furthermore, JFS raises the previous file size limitation of 2 GB to 2 terabytes. Partition size is raised from 64 GB to 2 terabytes allowing a file to be the same size as a partition.

Aurora is also enabled to work with **Vinca Co-Standby Server**, an IBM Business Partner solution that provides safeguards for companies that cannot tolerate down time. Vinca uses a server-mirroring technique which defines clustered resources on two nearly identical systems, creating high availability for both servers. Vinca Co-Standby Server for OS/2 keeps the entire network available by having the backup server take control if the primary system experiences a hardware failure. Users experience little or no interruption in services and are able to keep accessing the data and applications they need.

Aurora is enabled to take advantage of Vinca's fail over support, which allows the system taking over for the failing system to maintain its original identity. This Active-Active server configuration with bi-directional fail over enables two fully functional servers to protect each other. Companies can expand the life of older hardware, since the servers do not need to be identical. The servers can be managed remotely, making this solution ideal for branch offices and campuses.

The Vinca software configures a server to respond to multiple names and sharing of those names. To implement the Active-Active solution, the Aurora server must be enabled to respond to multiple NETBIOS names and the associated share names. Vinca implements the remainder of the function needed to implement the Active-Active solution -- failure detection, access to the hard drives of the failing system, configuration of a server to handle multiple names, migration of the shares to the new server, and management of access controls on the new server.

Another availability feature offered in Aurora is **Personally Safe n Sound (PSnS)**, a backup and restore feature that supports automatic file back-up to a wide range of storage devices, helps ensure against DASD malfunction, and offers fast recovery of deleted files. Comprehensive REXX and C application programming interfaces (APIs) and the new command-line interface allow access to backup and restore functions through user programs, a command line, and a graphical user interface (GUI). The APIs and command-line interface provide the power and flexibility to integrate backup policies with other administrative functions and manage them centrally with homegrown programs.

- IBM also added support for partitioned removable media, such as IOMEGA's JAZ and ZIP drives, a fast low-cost alternative to tape for smaller backups.
- A new option, the "dual-device backup set" optimizes the performance, capacity, and cost of the various storage media available today. A large-capacity medium, such as tape, is best used for baseline backup and a fast-access media, like JAZ and ZIP drives, is best used for incremental changes.

Keeping systems available and costs low involves enterprise system management. To help ensure that OS/2 environments enjoy the benefits of Tivoli's enterprise systems management, Aurora includes **Tivoli's Lightweight Client Framework (LCF) Endpoint Agent for OS/2**. Tivoli's enterprise systems management delivers high functionality at a low cost to customers with remote branch environments.

LCF in the Tivoli Framework 3.2 architecture increases the number of



The difficulty is in integrating this growing spectrum into the corporate network. Aurora helps to simplify this with support of the **Intelligent Input/Output Architecture Specification (I2O)**.

I2O is an industry standard architecture that defines a new interface from processor to I/O adapters. This specification provides for movement of function from the system CPU to the adapter card. Use of I2O, either on the motherboard or as an adapter in servers, frees up the CPU, which helps increase throughput. OS/2 Warp Server introduces I2O for SCSI drives and for Ethernet and token ring LAN.

Enterprises can now be confident that as long as their device driver supports the current I2O specification, OS/2 Warp Server will support that device driver. Existing mission critical OS/2 applications will run with new devices that comply with the current I2O specifications.

### **Responding Quickly to Business Needs at Reasonable Cost**

From an I/T perspective responding to business needs often requires purchasing a new system or application. Over time, purchases inspired by a specific requirement accumulate. The result can be a difficult-to-manage heterogeneous environment that strains resources and drives up support costs.

Aurora aims to help customers better manage the challenges of today's and tomorrow's mixed platform enterprises. Aurora fits within a customer's network, provides extensive heterogeneous client support, manages non-IBM NOS platforms, and provides powerful application, file, and print serving. The OS/2 Warp 4 interface, with enhancements based on customer feedback, provides a graphical interface for routine management tasks.

Aurora comfortably integrates into heterogeneous server environments with its new ability to manage NT 4.0 Servers, eliminating redundant maintenance tasks. Adding **Windows NT Server management** capability gives administrators the ability to create, update and delete user accounts, passwords and groups using an easy-to-use graphical interface or a rich command line interface. The user account and group information can be synchronized seamlessly with Windows NT 4.0 servers in the OS/2 Warp Server domain. In addition, end users only need to logon to one server to access all shared resources within the domain -- files, applications, and printers -- rather than entering multiple IDs and passwords to access information on different server NOS platforms.

A typical scenario would have OS/2 Warp Server as the primary domain controller where user accounts, passwords and some applications reside. Other servers in the network would host (or serve) applications such as databases or transaction software. One or more servers would also host (or serve) Windows NT for file/print and Win32 applications. End-users can now have universal access to all servers, files, printers and applications through a single OS/2 Warp Server domain.

The flow of user account data is unidirectional, from the Aurora domain to the NT additional Server. Managing User and Group accounts at the Aurora domain controller, with dynamic updates on the NT additional Server, eases the network administrator's workload. Where needed, administrators may configure persistent user accounts and groups that remain unique on either the NT or Aurora server.

With **DDNS** (Dynamic Domain Name Server) **for Windows 95 and NT Clients**, administrators no longer have to worry about the addresses for their Windows 95 and Windows NT clients. These DDNS clients bring added security to network clients and more importantly, to remote laptop users. Windows clients now have the same DDNS support administrators have relied on for managing OS/2 Warp, WorkSpace On-Demand and AIX clients. All the time formerly spent in large I/T shops manually updating domain servers with an IP address can now be used more productively.



And administrators can feel more comfortable with the added security that DDNS brings.

Dynamic Host Configuration Protocol (**DHCP**) enables a user to change locations within a network and dynamically get an IP address that works for that new location. DHCP will even assign the user the closest printer. As a side note, for customers that do not want to put this additional DDNS code on client workstations, DHCP proxy support allows network administrators to get the labor saving benefits of Dynamic IP on any industry standard DHCP client.

Dynamic IP allows users to just use the host name no matter how much movement there is around the network. Users are no longer encumbered with having to remember addresses for their colleagues or their printers. It's done automatically. The DDNS client dynamically changes the hostname-to-IP address mappings and provides additional security beyond the DDNS Proxy, which brings Dynamic IP capabilities to any DHCP client in the industry.

For responding to future business needs or retrofitting old programs for universal access, Aurora comes with two toolkits designed for e-business. **OS/2 Warp Developers Kit for Java 1.1.6**, currently available from IBM Software Choice, delivers a full implementation of Sun's Java Development Kit. It builds on the functionality already available with performance, scalability, and reliability enhancements. Look for the latest version to be included with Aurora at launch time.

Aurora supports the Light Directory Access Protocol (LDAP), a standards-based Internet directory protocol, and offers IBM's **OS/2 LDAP Client Toolkit for C and Java Version 1.0** for C and Java programmers who want to enable new or existing applications to access, search, and update LDAP servers, using LDAP V2 or LDAP V3 protocols. OS/2 LDAP Java/C Toolkit supplies the libraries, files, documentation, and samples needed to develop C or Java directory-enabled applications that can access a variety of LDAP-based directory servers.

The LDAP toolkit provides TCP/IP access to directories that support the LDAP protocol. This includes X.500 directories that support LDAP. The OS/2 LDAP V3 Client Toolkit includes various sample LDAP client programs and an LDAP client library used to provide programmatic access to the LDAP protocol. The LDAP toolkit for C programmers supports connections established using a Secure Socket Layer (SSL) interface. This can be used to provide data encryption of LDAP messages that flow between the LDAP client and server.

It takes more than just good programming languages and toolkits to be responsive to the constant demands of today's competitive environment. It requires an infrastructure architected for quick deployment of new software. The thin client architecture is state-of-the-art for quickly rolling out new applications or updates to a wide range of remotely located client systems. OS/2 Warp Server is the premiere platform for WorkSpace On-Demand, IBM's thin client offering. The Aurora enhancements to OS/2 Warp Server, especially in the areas of reliability and availability, only serve to strengthen it as a strategic server-based client platform.

Many customers that have installed WorkSpace On-Demand have found that it reduced their client ownership costs, expedited deployment of new applications and supported their transformation to the Java Application Model, while allowing them to maintain and use their existing OS/2 applications. Other customers have been pleased with WorkSpace On-Demand's ability to help them extend their investments in client hardware. In general, WorkSpace On-Demand is breaking new ground for companies undergoing an e-business transformation. (For more information on WorkSpace On-Demand see <http://www.software.ibm.com/enetwork/workspace.>)

Aurora's performance improvements add value to OS/2 Warp Server as a platform for WorkSpace On-Demand and Internet Web Serving. For



example, it includes a level of TCP/IP / MPTS with capacity and performance improvements over version TCP/IP V4.1. Connection management upgrades contribute to the improvements. Currently, a connection between two points requires three distinct resources to maintain the connection. When the connection shuts down, these resources create overhead while they wait for residual data or control information to complete. A better use of memory and faster connections can occur if a new incoming connection from the same host can use those existing resources.

Better connection buffering management also helps improve performance. Data traveling over the network interface is held in fixed-size buffers. Aurora improves throughput by synergistically regulating buffer size in correlation to the OS kernel. Other enhancements allow the Aurora TCP/IP to take advantage of the SMP kernel, reduce the amount of handshake required prior to connecting, and improve HTTP server connection management. These improvements help OS/2 Warp Server to handle a wider number of connections much faster -- exactly what's needed for a server-based architecture.

### **Aurora - Foundation for e-business Transformation**

Aurora consolidates previous OS/2 Warp Server V4 releases into a single, CD-media package. Current OS/2 Warp Server V4.0 FixPaks and current OS/2 Warp Server V4.0 Software Choice features will be rolled into Aurora, including **Year 2000 and euro currency readiness**, Java and Netscape, as well as improved TCP/IP. Aurora also includes Netfinity V5.2, LDAP Client, Dynamic IP Client for Win95 and NT and OS/2 Warp Server Backup/Restore V6.0. And the new high performance JFS delivers increased server reliability. Seamless Windows NT Server Management, which allows Windows NT 4.0 servers to be seamlessly integrated into a network, fortifies Aurora's capability in mixed environments. Industry standard support for Intelligent Input/Output (I2O) adapters for SCSI disks and LAN Ethernet and token ring is also planned.

What this adds up to is a powerful mission-critical foundation for the e-business transformation. Aurora's features are designed to meet the more rigorous performance and availability requirements of universal access. It can facilitate the transition to network computing and the Java Application Model with the Java and LDAP toolkits. Yet its support of existing OS/2 applications and eased administration of Windows platforms can preserve existing investments. And most definitely, it is the optimum platform for WorkSpace On-Demand -- IBM's proven product for reducing cost of ownership, speeding deployment of new applications and transitioning to network computing. Aurora is the definitive Intel server in a comprehensive computing infrastructure that meets today's and tomorrow's demanding requirements.

### **Appendix A - The First Step: Installation**

Aurora provides performance and capacity enhancements for both single and multiple processor systems. The Aurora installation process determines the processor configuration, installs both the uni-processor and SMP kernels on the hard drive, and utilizes the appropriate kernel. If additional processors are added, the upgrade process is simplified by a utility that points to the already installed SMP Kernel. Aurora is optimized for 8-way SMP systems. This is an optimization statement, not a limitation statement. The architectural limits for the CPUs will be 64.

Since many corporations use the CID install process, enhancements to that process were a priority. Aurora includes a "Top Install" shell to collect installation data and generate a response file for input to the CID installation of individual services. All operating system services are CID installable.

For attended installations, there is a single installation path similar to the



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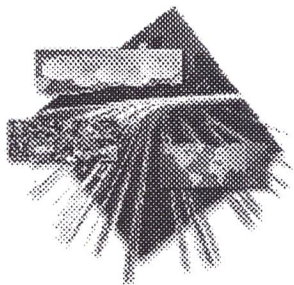
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## TCP/IP Enhancements for OS/2 Warp Server for e-business

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### Introduction

The e-business opportunities provided by using the Web to bring together customers, vendors, suppliers, and employees depend on continuing advancements in Internet technologies. To help unite the dependability of existing systems with the power of the Web, the next generation OS/2 Warp Server, code-named Aurora, will be ready for e-business, with planned availability (see [note](#)) in the first half of 1999.

Enhancements to the TCP/IP subsystem help provide a more robust and flexible infrastructure that can better equip OS/2 Warp Server users to meet the opportunities and challenges of a future driven by a networked economy. *OS/2 Warp Server for e-business* includes capacity and performance improvements to TCP/IP. Other enhancements allow the *OS/2 Warp Server for e-business* TCP/IP to:

- Make better use of memory
- Use more expeditious connection buffering management
- Take advantage of the SMP kernel
- Reduce the amount of handshake required prior to connecting
- Improve HTTP server connection management to handle a wider number of connections much faster.

This paper explores the technical aspects of the TCP/IP enhancements that give customers the benefit of a faster connection, improved throughput, and heightened security.

### Performance Enhancements

Faster network response times are essential to future growth of the Internet -- getting beyond the World Wide Wait to true e-business. Accordingly, the *OS/2 Warp Server for e-business* improved the TCP/IP 4.1 stack, fine tuning and adding enhancements to make it faster. A reduction of the time spent allocating the resources required by the stack at the time of a new request achieved the biggest strides. Some of the performance enhancing additions over TCP/IP 4.1 included:

- **Reduced connection resources** -- Connection management upgrades contribute to the improvements. Previously, a connection between two points required three basic blocks of resource to maintain the connection information -- one on each end and a structure with specific TCP protocol information. When the connection shuts down, these resources create overhead while they wait for residual data or control information to complete. A better use of memory and faster connections can occur if a new incoming connection from the same host can reuse those resources. Since memory allocation and initialization take time, enhancements to this area increased throughput.
  - The *timewait* state wastes precious kernel resources during lockout.



Since the underlying physical media has become more reliable, bypassing the timewait state and reusing those resources can appreciably reduce the time for allocation and initialization.

- **Outstanding connection buffering management** -- Data traveling over the network interface is held in fixed size buffers. *OS/2 Warp Server for e-business* improves performance throughput by synergistically regulating buffer size in correlation to the OS kernel.
- **Fast Path HTTP** - HTTP traffic is the most common type of Web activity. When requests pour in at a fast rate, a busy server must be able to accept the connections. To speed up connection time, the *OS/2 Warp Server for e-business* stack preallocates a cache of initialized structures that will be required when a new connection is requested. The stack has faster turn around time since all that is required when a new request comes in is assigning these structures as compared to allocating.
- **Faster access to kernel services** -- The KEE extensions provide modified kernel entry points into the stack. This helps give the stack faster access to kernel services like locks and memory allocation.
- **Quicker loopback processing** -- Time intensive wakeups are removed where possible.
- **Exceptional FTP Server Performance** -- The move from a multiprocess model to a new, enhanced multithreaded ftpd server provides faster connection response time and less memory overhead as requests are processed concurrently. Instead of starting a separate instance of FTPDC.EXE for each client, servicing each client with a separate thread improves performance. The ftpd server supports restarting broken data transfers. The restart option is compatible with the implementations commonly found on Linux and Sun. FTP-PM was modified to take advantage of the multithreaded ftpd server.
- **Improved TFTP Server Performance** -- Rewriting the Trivial File Transfer Protocol (TFTP) server as a multithreaded process contributed to the performance enhancements. Allowing the blocksize that TFTP uses for data transfer to vary between 512 and 8k bytes, rather than fixed at 512, yielded efficiencies and boosted BootP performance.
- **Extraordinary WEB Server performance** -- Two new sockets APIs were added to help improve the performance of Web servers:
  - *accept\_and\_recv() API* -- Added to support a call similar to AcceptEX() in Microsoft Windows NT environment. AcceptEX() will setup a new connection, return local and remote addresses, and receive the first block of data sent by the remote. Receiving the addresses and first block of data in a single output buffer can increase efficiencies.
  - *send\_file() API* -- Added to support a call similar to the NT function transmitfile(), which performs file transfer at ring 0 level. The API is designed to use handles to a connected socket and an open file; then in kernel mode it reads data directly from the system cache and passes it off to the transport protocol. This avoids the buffer copies, context switches, and kernel transitions associated with the typical methods of sending file data.

## Security Enhancements

### Increased Security Protection

To establish a TCP/IP connection, whether telnet, Web, or email, the client and server exchange several messages.



The vulnerability arises at the point where the server system has sent an acknowledgment (SYN-ACK) back to client but has not yet received the ACK message, creating a half-open connection. The server has a fixed size data structure describing all pending connections. This structure can be made to overflow by intentionally creating too many partially open connections. IP spoofing creates half-open connections. The attacking system sends SYN messages to the victim server. While these SYN messages appear legitimate, they reference a client system that is unable to respond to the SYN-ACK messages. Therefore, the final ACK message will never be sent. The half-open connection's data structure on the victim server system will eventually fill and the system will be unable to accept any new incoming connections until the table is emptied out. Normally there is a time-out associated with a pending connection, so the half-open connections will eventually expire and the victim server system will recover. However, the attacking system can simply continue sending IP-spoofed packets requesting new connections faster than the victim system can expire the pending connections. A syn attack can force the attacked machine to run out of memory, which makes it unable to service any requests, even valid ones.

The key to avoiding a syn attack is to postpone the resource allocation in the stack until the connection is complete. Therefore, preliminary state information is maintained in the sequence number until the connection is complete, then the stack initiates structure allocation. This feature is turned off by default. In case of an attack, it can be dynamically turned on using `inetcfg`, the stack configuration utility.

## Strong Encryption

Putting all the corporate resources -- files, printers, peripherals and applications -- at the fingertips of remote users helps increase productivity. A Virtual Private Network (VPN) permits a company to extend their secure network through the Internet, to mobile employees, business partners, and suppliers. Replacing a leased line with Internet access is cost effective. Because much of this activity involves the exchange of sensitive, personal, or confidential information, security concerns are paramount. Cryptography is the foundation of security for public networks and provides technology to accelerate the development of secure e-business solutions that:

- Assure data integrity
- Increase confidentiality
- Provide enhanced authentication of the identities of individuals and computers on networks

*OS/2 Warp Server for e-business* expanded data encryption standards include 56 bit encryption. These improved encryption standards make messages less susceptible to attack by hackers and result in increased security of data delivered over the VPN.

## Advantageous Authentication

*OS/2 Warp Server for e-business* extends the SOCKS protocol to include user datagram protocol (UDP) domains, and extends the framework to include provisions for a strong authentication scheme. Username/Password Authentication Protocol provides secure application-layer firewall traversal.

When configuration parameters are set in the `/mptn/etc/socks.env` and `/mptn/etc/socks.cfg` files, the applications invoke the SOCKS5 client. Thus, the enhancements provide a framework for client-server applications in both the TCP and UDP domains to conveniently and securely use the services of a network firewall.



# Management and Usability Enhancements

## Simplified Debugging

The TIME SERVER(TIMED) on OS/2 is an application that responds to client request for time. It is used to calculate elapsed time by returning the time, in seconds, since midnight Jan 1, 1900 in either local or GMT time. Enabling the trace flag for the server generates a log file that indicates the number of requests sent to the server by various clients. This trace option for the server can be enabled and disabled without having to stop and restart the server. The trace parameters can be dynamically updated by using an executable that is supplied along with the TIME SERVER. There is no need to stop and restart the server to enable or disable the TIME SERVER. Track and Restart Your File Transfer at the Point of Interruption

The FTP-PM client provides restart support through a GUI. This gives the user visual feedback about the status of the transfer and an option to restart the last interrupted transfer. The restart option is quite useful when you have a slow link and a broken file transfer connection. Starting all over again will result in more delay and possibly more transfer failure. Restarting a file transfer from the point of failure is much more efficient, as it enables better use of the data that has already been transferred.

The KeepDate function of command line ftp has been incorporated as an option so, at the time of transfer, the user can choose to preserve the original file time stamp. This helps a user track the status of remote files and know when changes have been made. To update the local file set with only the latest changed files, enable the keepdate option and transfer the files. Once the files are on the local disk, it is easy to see which files are the latest version.

- To help a TCP/IP programmer use the new APIs in customized file transfer applications, three new API calls were added to FTPAPI.DLL. These are the FTPRESTART, FTPSIZE and KEEP\_FILE\_DATE calls.

## Broad Management Capabilities

The Preboot eXecution Environment (PXE) client is a Workstation with a Network card updated with PXE BIOS. The DHCP Server component of *OS/2 Warp Server for e-business* supports the Intel "Wired for Management Spec" that defines the method for enhancing DHCP to support PXE. The DHCP Server sends information about the Image Server to the PXE Client. Then the PXE Client contacts the Boot Image Negotiation Layer (BINL) Server and gets the boot image through TFTP. The server supports both LSA-1 & LSA-2 clients. The BINL server works in conjunction with the DHCP server and provides a mechanism of negotiating the Boot Image.

## Share Business Data Across the Enterprise - Even Remotely

The value of business data to the corporation increases as the data usage is extended. *OS/2 Warp Server for e-business*'s new functions help extend the reach of business data by enabling it to be shared horizontally -- interdepartmentally or company-wide. The Network File System (NFS) in *OS/2 Warp Server for e-business* provides a cost-effective way to manage information as a sharable resource. Now the TCP 4.x broadens the reach of the data by providing transparent remote access to shared files across networks. Remote Procedure Call (RPC) primitives built on top of an eXternal data Representation (XDR) make NFS portable across different machines, operating systems, network architectures, and transport protocols.

NFS employs a client-server model, where the *server* is the host that holds the file and *client* is the application accessing the file. When creating files and directories, a client can specify access permission bits and the NFS server honors the permission bits specified by the client. NFS version 3 moves function to Ring 0 and adds caching, resulting in increased client performance.

- The primary function of the NFSBIOD is to perform optional parallel reads and writes. All IFS calls are handled by NFSBIOD and remain in ring 0. The NFSBIOD code of version 2.0 is moved to the IFS.
- Adding caching to the NFS client increases performance. The NFS Client does:
  - **Attribute Caching** -- File and directory attributes are cached to avoid repeated NFS\_LOOKUP calls.
  - **Data Caching** -- The File Data is cached at the client side. The read size is rounded up to the NFS transfer size. This reduces the number of NFS\_READ calls that are commonly made by the OS/2 Loader and Work Place Shell. Data Read Ahead is implemented at the Client end. When the Client detects sequential reads of the file, the next read is requested before the application actually makes the request.

Java's platform-independence and remote configuration capabilities help facilitate the e-business transition. These benefits are extended to NFS, which now supports Java 1.1.6 and can be configured using the Java Configuration Application.

WebNFS servers implement semantic extensions to the NFS protocol to support lightweight binding mechanism for conventional or web browser clients that need to communicate with NFS servers across the Internet. A webNFS server supports the multicomponent lookup features.

## Expand the Print Capabilities of Network Computers

An OS/2 Warp 4.0 print server and an OS/2 Warp 4.0 workstation running line print daemon (LPD) can now receive print jobs from a Network Computer since *OS/2 Warp Server for e-business* added streaming mode to the TCP/IP LPD print protocol. This allows Network Computers (NCs) to use the streaming mode LPR/LPD protocol to help avoid memory overflows, since in streaming mode, an entire print job does not have to be stored in memory. Additionally, LPD can handle printing multiple copies of a print job from an LPR print client on a Network Computer.

*OS/2 Warp Server for e-business* adds security to the Print Server implementation (LPD) on OS/2. NC's can securely access OS/2 warp print queues by authentication of client for printing and canceling the job. When a print job arrives, LPD needs to verify that the print client is authorized to print to the requested print queue. LPD should allow the print client that submits the print job to cancel the job after authentication. An ASCII file HOSTS.LPD will be used by the LPD to check if security is enabled for a particular queue and to check which hosts are authorized to print to that queue.

LPRPORTD, the TCP/IP LPR print protocol solution on the OS/2 platform, added streaming mode to work with an LPD print server on a Network Computer. This allow an OS/2 Warp 4.0 print server and an OS/2 Warp 4.0 workstation running LPRPORTD to send print jobs using Network Computer. Network Computers use the streaming mode LPR/LPD protocol to help avoid memory overflows, since in streaming mode, an entire print job does not have to be stored in memory. Both non-streaming and streaming modes are support by LPRPORTD.

## Summary

For a business to successfully transform into an e-business, it is essential for the company to leverage the IT infrastructure to effectively and expediently transform how it conducts business. The measure of success depends on the underlying e-business infrastructure. IBM has enhanced the already dependable OS/2 Warp Server to support a flexible and cost effective e-business transformation.

### What's new with Aurora's TCP/IP?

- It is now possible to install Network File System (NFS) while installing TCP/IP 4.21 rather than as a separately installed kit.



- If the installation finds an old version of NFS the option exists for it to be automatically upgraded.
- The TIME SERVER is now available as part of the TCP/IP BASE and can be configured to run as one of the AUTOSTARTABLE services that automatically start at boot time.
- The Boot Image Negotiation Layer (BINL) Server is now available as part of DHCP/DDNS Either Netscape Communicator for OS/2 or Netscape Navigator 2.02 can now be used to install TCP/IP 4.21.
- Support for version 2.0 kits has been removed.
- Personal Communications (PCOMM) is removed from the TCP/IP Installation package.
- Configuration applications now can run on Java 1.1.6 for OS/2
- Java's platform-independence and remote configuration capabilities are extended to NFS, which now can be configured using the Java Configuration Application.

**Note:** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

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## WebSphere Brings Server-side Java™ to OS/2 Warp Server for e-business

### Introduction

Once you discover the power of an e-business, you know the opportunities afforded by combining the broad reach of the Internet with your traditional information technology systems. The worlds of Web computing, enterprise computing and Java are merging as the Internet becomes part of the global business fabric. Many corporations are discovering that their Web applications are now mission-critical. Therefore, OS/2 Warp Server for e-business will ship with IBM WebSphere Application Server 1.1 and Lotus Domino Go. This powerful combination establishes an environment that can help organizations move into server-side Java execution.

### Use the Strength of the Server to Web-Enable Your Clients

The server-side Java environment is where the realms of Web computing, enterprise computing and Java meet. Most companies today either are implementing, or planning to soon implement, Java on their clients. All popular desktop operating systems now have Java Virtual Machines (JVMs). The disparate mix of desktop systems dispersed across most corporations, each with its unique combination of operating systems, applications, and support requirements, puts heightened strain on IS. To help rein in escalating administration costs and issues, centralized management is leading to "thinner" client systems. Also, many corporations need to prolong the life of existing PCs that are under-powered for increasingly power-hungry applications. With WebSphere's server-side Java capability, virtually any system that can run a browser can participate.

OS/2 Warp Server for e-business with Lotus Domino Go and WebSphere delivers a powerful combination of integrated services to help organizations move beyond the limitations of old Common Gateway Interface (CGI) and PERL scripts. WebSphere 1.1 included with Warp Server for e-business provides:

- A servlet runtime engine
- High-performance database connectors
- Application services for session and state management

Web developers can benefit from the structured and reliable Java servlet environment while encapsulation enables them to leverage their existing CGI and PERL-based applications. Compared with CGI programs, Java servlets are more secure, and provide better performance and scalability -- features that make administration easier. Being Java, the servlets can exploit the beneficial capabilities of Java, including security, platform independence, and reusability. These servlets can provide safe and secure access to back-tier relational databases, transaction-based systems, and applications, while generating dynamic content for the Web client. This programming model eliminates the need for access to existing systems from outside a firewall. Businesses can rapidly and securely extend their existing software assets to an e-business model.

### What is WebSphere?

IBM WebSphere is a set of software products that helps customers deploy and manage high performance Web sites. It helps ease the transition from simple



Web publishing to advanced e-business Web applications. Because WebSphere is based on open standards, customers benefit from cross-platform portability. With this portability comes scalability. As business needs grow, an application can progressively move to more powerful platforms. As performance demands increase, the same Web application could move from OS/2 Warp Server for e-business to an AS/400 or Solaris and ultimately to an OS/390. The application can also be run from various platforms already installed in the company, achieving a horizontal scaling by utilizing these existing assets.

*Network Computing Online* reviewed WebSphere in an article that can be read at <http://www.networkcomputing.com/913/913sp2.html>. Among the "Thunderous Capabilities" they reported that WebSphere:

- Improves CPU utilization and workload balancing for Java servlets
- Replaces old C and PERL CGI scripts
- Is built entirely on open standards like CORBA, JDBC, and Java
- Lets you implement advanced applications on the server using Java
- Simplifies implementing and running servlets

## Summary

The addition of IBM's WebSphere Application Server to OS/2 Warp Server for e-business provides the foundation for deploying Web applications using the Java servlet programming model. With this technology, corporations can design and develop server-side e-business applications using a common programming model and placing business logic where it makes the most sense for each application.

Since Java servlets are more secure, have better performance, provide easier administration and greater scalability than Common Gateway Interface (CGI) programs, WebSphere can help rapidly evolve into dynamic, personalized "Web applications" that are an integral part of the enterprise business processes.

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More information on the OS/2 family of products is available at <http://www.software.ibm.com/os/warp>. Aurora information can be found at: <http://www.software.ibm.com/os/warp/products/aurora>. Read more about WebSphere at <http://www.software.ibm.com/websphere/>.

IBM software offers the widest range of applications, middleware and operating systems for all types of computing platforms, allowing customers to take full advantage of the new era of e-business. The fastest way to get the latest information about IBM software is through the IBM software home page at <http://www.software.ibm.com>.

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## Aurora - The next OS/2 Warp Server: File System Services Technical White Paper

### Introduction

Remember the wonders of the 10-megabyte (MB) hard drive on the first IBM PC XT? And how long it took to outgrow?

As files and partitions grew larger, new file systems like IBM's High Performance File System (HPFS) provided faster disk access and improved overall performance. Now that high-capacity drives--with storage capacity in the gigabytes--fit in your hand, audio and video files consume many megabytes of space, and PC databases approach terabytes of data, new demands on the file system are driving changes. Research shows that 625 new terabytes of data are added to the Internet each month. Technologies are evolving to meet the challenge with rapid expansion of hardware capacity. These large amounts of data and the growing networks interconnecting computers worldwide impact today's file system dynamics.

IBM is bringing a Journaled File System (JFS) to the next version of OS/2 Warp Server, code named Aurora. Designed for faster performance, enhanced Web and Lotus Notes serving capability, and improved scalability, Aurora with JFS positions customers to better meet their business objectives as they transition to a network computing environment. They can now implement JFS and use the latest high-capacity DASD that their hardware supports. Designed for the high throughput and reliability requirements of corporate servers, JFS has incredibly quick recovery times that are an essential factor in improving server availability. Logical Volume Manager (LVM), also new to Aurora, helps administrators balance dynamic file requirements. Now a partition can be expanded dynamically and a volume can span physical disks. While maintaining compatibility with existing applications that use FAT, HPFS and HPFS386, JFS and LVM combine to provide:

- A significant reduction in file restore time
- Increased file and partition size limitations
- "Sticky" and dynamic drive letter assignments for enhanced support of removable media
- Enhanced performance scalability on Symmetrical Multiprocessor (SMP) systems

### Boost Server Availability

An e-business environment can't endure the lengthy file system recovery times required after a system crash with a non-journaled file system. Using proven database journaling techniques taken from IBM's AIX system, the OS/2 JFS can restore a file system to a consistent state in a matter of seconds or minutes, compared to non-journaling file systems like FAT and HPFS, which can take hours or days depending on the partition size.

FAT, HPFS, and other file systems are subject to corruption in the event of a system failure, since a logical file operation, for example a "create," often takes multiple I/Os to accomplish and may not be reflected in the data at any given point in time. These file systems rely on time-consuming and tedious processes like CHKDSK that examine all of a file system's directories and disk-addressing structures to restore a file system to a reliable state. In contrast, JFS creates a continuous log of transactions performed on the file system. In the event of a system failure, the file system is restored quickly and accurately by replaying the log and rewriting records for the appropriate transactions. JFS is not a bootable



partition. FAT or HPFS still must be used for the bootable file system. We recommend that HPFS be used as the boot partition to support the Java Virtual Machine's long file names.

## Break File System Limitations

As businesses expand and new opportunities emerge, hard drives and their supporting files begin bursting with data and quickly exceed the defined boundaries. Remember when the industry said that no one would ever need more than 10 megabytes of hard disk capacity? New technology continuously grows the hard file and removable media capacity to new heights. All these changes render the old file and partition sizes too limiting. The new file and partition sizes supported by JFS significantly strengthen OS/2's server capability. JFS raises the previous file size limitation of 2 gigabytes to 2 terabytes. Partition size is raised from 64 gigabytes to 2 terabytes, so a file can now be as big as a partition. The maximum number of files and directories within a single JFS file system is over 4 billion.

JFS offers an alternative to pre-allocating all hard file space in blocks. *Sparse files* only occupy the amount of disk space that is consumed by the data. The actual allocation of any given block in the file doesn't occur until a write operation is performed to that block. In practice you could define a 1 petabyte file inside a 1 megabyte partition, as long as you don't write more data than can fit on the physical partition.

## Maximize Hard File Resources

As companies, their departments, and supporting databases become larger, LVM will make it easier to grow the server with new physical disk drives (DASD). The growing volume of files and databases require expandable system DASD. Logical drives can now span multiple physical hard drives. With permanent or sticky drive letter assignments, hard drives can be moved or added without changing drive letter designation, thus keeping program path information consistent. Partitions can dynamically grow without reformatting or rebooting the system. IBM enabled both GUI and command line APIs to access LVM, allowing maximum flexibility in implementation methods. New with LVM is LVMDISK, which replaces FDISK. LVM makes it easier for I/T to manage dynamic DASD requirements.

JFS supports the expansion of a mounted and actively accessed file system. Should a file run out of space, the system administrator can increase the volume size without disrupting ongoing transactions. This eliminates the need to stop, back up, reformat the partition, and then restore the data. With JFS and LVM, a partition can be extended without reformatting the file system that it contains. Additionally, it is possible to write a routine that would automatically increase a volume as long as the space is available.

- For example, IBM's DB2 on OS/2 returns an error message that indicates an "out-of-space" condition for a given partition. A routine could be written to intercept the error message and kick off another routine calling on LVM's APIs to dynamically increase the partition by a predetermined size -- an efficient way to automatically handle the error condition.

Based on the application environment, DASD space utilization can be optimized with block sizes of 512, 1024, 2048, and 4096 bytes. While smaller block sizes allow more efficient use of disk space, they can increase access time. The default block size is set at 4096 bytes since performance, rather than space utilization, is generally the primary consideration for server systems.

Free space may be defragmented on DASD while it is active. Once the free space becomes fragmented, defragging the file system allows JFS to provide more I/O-efficient disk allocations and avoid some out-of-space conditions.

Consistent with HPFS, JFS supports upper and lower case for names. Case is preserved in the storage and retrieval of file names, but is ignored during directory searches. All file and directory names are stored and managed as strings of unicode characters. Like HPFS, JFS limits file or directory names to 255 unicode characters.

# Network File System

Enabling business data to be shared horizontally across the enterprise generally increases its value. Aurora delivers a cost-effective way to manage information interdepartmentally or company-wide. With Network File System (NFS), a feature now included with Aurora, a RISC (AIX/UNIX) DASD can be mounted and made a sharable resource to the server's users. Sharing data -- files and databases -- reduces the number of pieces of software that must be maintained, which simplifies system administration and helps contain costs.

## Summary

Aurora provides a proven mission-critical foundation for the transformation to the Network Computing and e-business environments, while supporting legacy applications and integrating OS/2 more tightly into the IBM family of business servers. Aurora's Journaled File System provides a state-of-the-art, quickly recoverable, transaction-oriented, log-based, scaleable file system. The increased performance from scalability and the enhanced reliability that JFS provides make Aurora better suited to Web and Lotus Notes serving in support of network computing and e-business. With LVM and its ability to span multiple physical drives for a single partition, sticky drive letter assignments, and increasing partitions dynamically, you have a strong team. Bring in the added value of NFS and its network flexibility and you have a winning combination of hard disk and file management that's unbeatable in the Intel PC server market.

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## Euro Currency Discussion White Paper

The purpose of this document is to provide an overview of the euro currency, and describe its implementation in OS/2 and DOS environments.

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### Background

The European Monetary Union is part of the Economic and Monetary Union (EMU) directly following the Maastricht Treaty of 1992. The treaty provides for the fixing of exchange rates between national currencies, leading eventually to the single currency, the euro. The timetable has been set out in the Maastricht Treaty, with the EMU being established in three stages. Stage Three marks the actual beginning of the monetary union.

The eleven participants are Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

**Stage One:** On May 2-3, 1998 the eleven participating countries in the euro currency were officially announced at a special summit of the European Union in Brussels. The terms of their participation, including the fixing of exchange rates, was also established. By July, 1998, the European Central Bank was established, which will set monetary policy for the eleven countries in the EMU.

**Stage Two:** On January 1, 1999 the currency system in the EMU will officially begin to function; the European Central Bank will begin to set monetary policy, but national currencies will remain in circulation. Stocks and government debt, as well as mortgages and credit cards, will begin to be noted in euros and companies will be able to begin accounting in euros.

**Stage Three:** On January 1, 2002 euro notes and coins begin to circulate in a 'dual currency period' for the eleven countries. By July, 2002, the national currencies will disappear and the euro will become the single currency for all countries in the EMU.

For more information on the pros and cons of the EMU and its impact on the European Union social and economic factors, see the web site <http://amue.lf.net>. This site is owned by the Association for the Monetary Union of Europe (AMUE), which is a vendors' association. Also, the euro has its own home page: <http://euro.eu.int>

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### IBM and the Euro

IBM announced on March 17, 1998, its position regarding the handling of the euro currency. This is documented in a European announcement letter, reference ZA98-0104.

In summary, IBM announced offerings in support of the start of Stage Three of the European Monetary Union (EMU) and the introduction of the single European Currency - the euro. These announcements covered:

- All IBM products which use currency symbols.
- A range of consultancy and service offerings to address the specific needs of customer's EMU transition plans.
- Application solutions which include the handling of monetary amounts.

Those products which need to process currency symbols available from IBM after January 1, 1999 will support the euro symbol and will be described as euro-ready products. Support for the euro currency symbol may also be available for earlier products and versions as orderable options, (i.e. Upgrade Kits, PTFs etc.).

IBM has adopted the following definition for euro-ready products: IBM considers a product to be

euro-ready if the product, when used in accordance with its associated documentation, is capable of correctly processing monetary data in the euro denomination, respecting the euro currency formatting conventions (including the euro symbol). This assumes that all other products (i.e. hardware, software, firmware, etc.) that are used with this product are also euro-ready.

A limited number of specific products may not be euro-ready due to technical or other issues. Information is available on the IBM euro site at: <http://www.europe.ibm.com/euro>

Also, the Year 2000 Customer Readiness data base has been enhanced to include euro readiness, and is available at: <http://www.euro.raleigh.ibm.com/>

For more information on specific products, consultancy and services, and application solutions, refer to the announcement letter.

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## **Currency Symbol**

The symbol for the new euro currency is:

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## **OS/2 Support for the Euro Currency**

OS/2 support for the euro consists of adding the euro character to fonts, code pages, and keyboards. The euro can be used in base OS/2, Presentation Manager (PM) components of some versions of OS/2 products, and in PC DOS 2000.

The OS/2 implementation of the euro currency symbol is discussed in the following categories:

- Code pages and fonts
- Keyboards
- Printing
- Areas not supported

For further information on OS/2 euro support plans, see

- <http://ps.boulder.ibm.com/pbin-usa-ps/getobi.pl?pdocs-usa/euro.html>

---

## **Code pages and fonts**

The euro is added to some display and ATM fonts and to the Times New Roman MT 30 True Type font which is available with Java 1.1.

The euro character is added to these OS/2 base and PM code pages



<b>Code Page</b>	<b>Font</b>	<b>Supported in</b>
850	PC Latin 1	base +PM
857	PC Turkish	base+PM
1004	Windows Extended	base+PM
1250	Windows Latin 2	PM
1251	Windows Cyrillic	PM
1252	Windows Latin2	PM
1254	Windows Turkish	PM
1257	Windows Baltic PM	PM

The euro character is added to these fonts

Courier	bitmap - ATM
Helv	bitmap
Helvetica	ATM
System Monospace	bitmap
System Proportional	bitmap
System VIO	bitmap
Times New Roman	ATM
Times New Roman MT 30	True Type - Java 1.1
Tms Rmn	bitmap
WarpSans	bitmap

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## Keyboards

The euro is added to all western European keyboards and the US International keyboard. It is placed at ALTGR-e, ALTGR-5, or ALTGR-4 on these keyboards. ALTGR (Alt Graphics) is the right Alt key on most keyboards (but not the US keyboard). This key is pressed and held while typing another key on the keyboard. This is known in ISO 9995 as level 3. The character from this position is engraved on the lower right of the key, or on the front face of the key. However, in many cases the ALTGR keys are not engraved at all.

The euro character is added to these OS/2 keyboards: Belgium, Canada, Canadian French, Denmark, Finland, France, Germany, Germany (453), Iceland, Iceland 101, Italy, Italy Extended, Latin America, Netherlands, Norway, Portugal, Spain, Sweden, Swiss French, Swiss German, Turkey, Turkey 440, UK, UK 168, US International. It is placed at ALTGR-e, ALTGR-5, or ALTGR-4 on these keyboards.

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## Printing

The euro will print correctly on printers where the system fonts are used. You need to select a font which is not mapped to a device font in order to print the euro, since most existing printers do not support the euro in device fonts. When there are print problems, a dotless-i (character replaced by

euro) is normally printed instead of the euro.

For PostScript printers, it is necessary to disable device fonts to print the euro in one of the base PostScript fonts (Helvetica, Times Roman, Courier). To do this:

1. Open the properties of the Printer object
2. Select the Print Driver tab
3. Select Job properties
4. Select the Output tab
5. Deselect "Use printer device fonts"

---

## Areas not supported

The euro is not supported in WinOS2. This character is not supported in the Windows - 1252 code page used in WinOS2, and is not available on the WinOS2 keyboards. This character is also not available in the WinOS2 supplied True Type fonts: Arial and Courier New.

The euro is not in code page 437 (US English) or 868 (Canadian French), so use code page 850 instead to get the euro. The euro is not on the US keyboard but the US International keyboard can be used instead.

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## Euro implementation by platform

Each IBM platform has implemented support for the euro currency. Refer to each platform's home page to get more information on the specific implementation for that platform.

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## Microsoft implementation

Microsoft is not planning to have product updates to support the euro currency for any Windows version prior to Windows 95 (Windows 3.x, Windows for Workgroup 3.x and below) and all versions of DOS. For additional information refer to: <http://www.microsoft.com/europe/euro/facts1.htm>

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## PC DOS 2000 Euro Support

Support for the European Monetary Union's euro currency symbol is provided in IBM's PC DOS 2000 by a modified code page 850 and additional keyboard support.

The modified code page 850, which replaces the "dot-less i" character at offset D5h with the euro symbol, is equivalent to the new code page 858 proposed by the EMU. This code page is provided in the EGA.CPI, EGAX.CPI and ISO.CPI files which are automatically installed by PC DOS 2000. When you select a country and/or keyboard from the table below, this new code page 850 is automatically made the default code page. The only exception to this are the two Turkish keyboards, where the default is code page 857. For these keyboards, you can switch to this code page using the CHCP command. This command can be added to the AUTOEXEC.BAT file so that the code page is always activated at startup.

Keyboard support is provided in a new KEYBOARD.SYS file which maps an alternate key stroke sequence to the euro symbol according to the table below. When you select a country and/or keyboard at installation or when configuring PC DOS 2000, the keyboard support for the euro symbol is automatically installed.

The following table lists the countries and keyboards that have support for the euro currency symbol:



<b>Country</b>	<b>Code</b>	<b>Key Sequence</b>
Belgium	BE	AltGr - e
Canadian French	CF	AltGr - e
Denmark	DK	AltGr - 5
Finland	SU	AltGr - 5
France (189)	FR	AltGr - e
France(120)	Same as FR above, but use /ID:120	
Germany(129)	GR	AltGr - e
Germany(453)	Same as GR above, but use /ID:453	
Iceland	IC	AltGr - 5
International English	UX	AltGr - 5
Italy(141)	IT	AltGr - 5
Italy(142)	Same as IT above, but use /ID:142	
Latin America	LA	AltGr - e
Netherlands	NL	AltGr - e
Norway	NO	AltGr - 5
Portugal	PO	AltGr - 5
Spain	SP	AltGr - 5
Sweden	SV	AltGr - 5
Swiss French	SF	AltGr - e
Swiss German	SG	AltGr - e
Turkey(440)	TR	AltGr - e
Turkey(179)	Same as TR above, but use /ID:179	
UK	UK	AltGr - 4

For further information on the Euro support, see: [http://www.ibm.com/IBM/yea\\_r2000/mkt/des/pcdos7.html](http://www.ibm.com/IBM/yea_r2000/mkt/des/pcdos7.html)

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## Summary

This discussion paper has reviewed the support for the euro currency in both OS/2 and DOS. It has focused primarily on how support for displaying and printing the euro currency symbol has been implemented in these products. It is important to continue to monitor the web sites referenced in this discussion paper for the latest information on the implementation of the euro currency.

## Manage NT Server Domains

**Author: Valerie Jackson IBM  
Network Computing Software**

February, 1999

### Introduction

OS/2 Warp Server's proven track record in running your mission-critical applications has earned it a solid position in your IT infrastructure. Likewise, you may have Microsoft Windows NT servers performing other important functions within your organization. Both are essential to areas of your operations. So, as you evolve toward an e-business, management of the disparate systems doesn't need to cause either environment to be displaced. Migration can be very expensive. Generally, the fastest, most cost-effective path to e-business is to extend your existing hardware and software -- the applications that have been running your business for years. OS/2 Warp Server for e-business now provides the opportunity to improve the synchronization and customization of managing NT Server and OS/2 Warp Server environments.

### Streamline Network Administration

Corporate network administrators understand the burden created by trying to manage the additional responsibilities generated by today's heterogeneous environments. They know the hassle of keeping user and group accounts synchronized. OS/2 Warp Server for e-business builds on Warp Server's robust account management features with additional functionality that curtails redundant administrative tasks. Now, the harried administrator, overwhelmed by the problems of user account management, can let the IBM Networks User Account Manager simplify the tasks. Through new functionality, OS/2 Warp Server for e-business acts as an integration expert to manage Windows NT servers, User, and Group account information. With the synchronization of the account database, dual maintenance of user accounts in multiple network domains is no longer a concern.

OS/2 Warp Server for e-business acts as a primary domain controller that manages network resources and user account information. However, an NT server cannot be an additional server in both an NT domain and a Warp Server domain because no additional server can be in multiple domains at the same time. All systems must be in a Warp Server domain.

Running as a service on a Windows NT 4.0 Server, the IBM Networks User Account Manager can automatically keep user and group accounts synchronized with the Warp Server domain. For example, when resetting a user password, the double maintenance of changing the password on the Warp Server domain and then on the NT Server has been eliminated. Now, simply update the account on the Warp Server domain and you are done. The Windows NT server is defined as an additional server in the domain, and all domain account updates stay synchronized, just like the additional OS/2 Warp Server servers in your domain.

The IBM Networks User Account Manager gives administrators the capability to configure persistent user accounts and groups to remain unique on the NT server. Persistent accounts are local NT accounts and are not synchronized with the Warp Server domain. This allows administrators flexibility in designating



which access controls are propagated throughout the domain. OS/2 Warp Server for e-business supplies a configuration GUI to manage persistent accounts. The GUI is accessible from the NT Network Properties folder. The NT Server system clock can be synchronized with the OS/2 Warp Server for e-business server domain controller via the GUI.

Administrators have the flexibility to create, delete or update User and Group accounts through the OS/2 Warp Server for e-business GUI or the command line interface. Resource control is simplified since administrators can create 'Group' access controls on the NT server and then add those users to 'Groups' in the domain. A full synchronization of the user and group account database can be requested from the NT server. Since the Microsoft NT user administration tools will not operate to OS/2 domain controllers, User/Group (UAS) Replication is one way -- from the domain controller to the additional servers. In a mixed Warp Server and NT environment, the account information flows from the OS/2 Warp Server for e-business domain controller to the NT server.

## **End Users Benefit From Easier Access to Network Resources**

Users no longer have to remember multiple passwords for multiple network resources. End users benefit from the single network logon that allows them to access multiple network resources on mixed platforms. The single domain logon feature allows user access to files, printers and applications on OS/2 Warp Server for e-business and NT servers through user name and password synchronization.

## **Support a Broad Range of Clients**

Today's computing environments are filled with an array of client types. You already made big investments, so you need to leverage what you have. Therefore, two key components of OS/2 Warp Server for e-business are the Windows 95 and Windows NT clients. These clients allow you to leverage the power of OS/2 Warp Server on your server while maintaining compatibility with your Windows 95 and NT client installations.

Now you can authenticate your Windows 95 and NT users to your existing Warp Server domains. Eliminating the need for a separately administered Windows NT server permits a single point of user administration for all the clients on your network.

OS/2 Warp Server for e-business maintains compatibility with Windows' roaming user profiles and user policies. Support for these features is built-in. Additionally, these clients provide support for standard Warp Server features such as Network Applications, Logon Assignments, and Network Messaging, while providing increased Warp Server administration capabilities. With IBM's Windows 95 and NT clients, you get the best of both worlds -- client side compatibility and Warp Server power -- features that can help you transform your I/T investments into a strategic advantage in a competitive, global market.

## **Summary**

Corporate mergers and diverse application needs throughout the organization continue to create complex heterogeneous environments that face issues of network administration and system management. The NT User Account Management functions of OS/2 Warp Server for e-business enable an administrator to integrate access controls and user management in mixed OS/2 and NT environments. NT resources can be managed without the need to bring in an NT server and the additional related skills. Now drop the NT Server in, define it as a new server in the OS/2 environment and manage it -- transparently.

OS/2 Warp Server for e-business extends your existing OS/2 Warp environment to integrate existing Windows NT Servers into a manageable IT infrastructure. Rather than grapple with migration issues, save those hardware, software, and time resources by using OS/2 Warp Server for e-business to incorporate your

existing OS/2 Warp and Windows NT servers into an environment that helps reduce the administration demands. Integration helps reduce the maintenance of user accounts, passwords, and groups for multiple network resources on multiple platforms. By including Networks User Account Manager, OS/2 Warp Server for e-business takes the strain out of maintaining heterogeneous server environments. Now administrators can meet the challenge of coordinating users and groups disparate systems.

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## IBM TCP/IP V4.1 for OS/2 - Performance Report

November 7, 1997

Warp Server has long had a well-performing TCP/IP implementation. The performance and capacity have been further improved, especially on Pentium Pro processors. Depending on the workload and communication line speeds, these improvements may result in either lower CPU utilization, greater throughput, or both. Examples of the improvements include:

- Tests of 64 atomic-level functions over each of Ethernet and Token-ring show a geometric mean improvement of 20% a Pentium processor and 40% improvement on a Intel Pentium Pro.
- The test results below were obtained on an IBM PC Server 704 (one Pentium Pro 200 MHz) using an IBM PCI 100 Mbps Ethernet adapter except as noted.
- A simple socket-level inquiry-response test, sending 256 data bytes each direction shows an 25% increase in throughput. On the same test a sixteen Mbps Token-Ring delivered a 21% increase.
- A one-way data-stream test using 512 byte messages results in a 56% increase in throughput. In general, as average message size increases the percentage improvement in throughput will be less.
- Using TCP/IP 4.1 with Notes Domino Server (R4.6 prerelease 3) a 21% increase in Webstone 2.0b connections-per-second.
- A Notes Domino Server benchmark doing fixed-throughput mail workload simulating 800 traditional Notes clients over token-ring demonstrated a 13% response time improvement and 8% reduction in CPU utilization.
- In comparison to OS/2 Internet Connection Server (ICS) 4.2 on OS/2 Warp Server TCP/IP, the new Domino Go 4.6 with TCP/IP 4.1 gives 60% greater connections-per-second. This number demonstrates the combined performance improvements in both Domino Go and TCP/IP 4.1.
- Maximum concurrent sockets has been increased from 2,048 to 32,768. What this means is more potentially connections to the server for example from Notes and Domino clients.

The performance estimates contained in this document are believed to be

sound, but IBM does not warrant or guarantee that you can or will achieve similar results on your system. It is your responsibility to validate the estimates and determine their relevance to your operation.

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\*\*\* For more information on TCP/IP 4.1 for OS/2 go to

<http://www.software.ibm.com/os/warp/a5.html>

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